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ABSTRACT

As part of a project that identified the specific literacy skills required in ten occupations, this report provides two levels of instructional information about licensed practical nurses (LPNs). Factual data are presented in Parts I and II for use in decision making by program developers, administrators, teachers, and counselors. These sections note the specific literacy requirements (reading, writing, listening, speaking, and mathematics) that were identified at three job sites and three vocational training programs. Part III presents instructional methods/materials that adult basic education teachers can use to develop literacy skills while imparting job related knowledge. The lesson format is based on a directed reading activity and includes vocabulary and concept development, sentence and organizational structure, silent reading, and skill development. Appendixes list the technical vocabulary that LPNs and LPN trainees need to know, the 100 words that represent 45% of the language sampled for the entire project, and occupational literacy requirements for the ten occupations that were studied. (RL)

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THE LITERACY REQUIREMENTS OF A HEATING AND AIR CONDITIONING MECHANIC ON THE JOB AND IN A VOCATIONAL TRAINING PROGRAM

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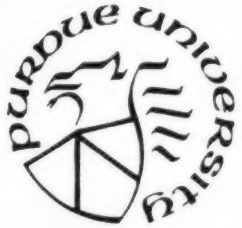

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PROJECT ABSTRACT

THE IDENTIFICATION OF LITERACY REQUIREMENTS OF JOBS IN INDUSTRY AND CORRESPONDING VOCATIONAL TRAINING PROGRAMS

1.	Need Addressed:	Meeting the educational needs of adults with minimal literacy skills who wish to enter skilled or semi-skilled occupations.
2.	Population Served:	Adults with minimal literacy skills.
3.	Brief Description:	Specific literacy requirements (reading, writing, listening, speaking, and mathematics) of semi-skilled and skilled occupations in business, industry and vocational training programs were determined. The literacy demands of three work contexts and training programs for each of the ten occupations were analyzed and reported.
4.	Major Objectives:	To provide educators, counselors, and administrators with a description of the literacy requirements of semi-skilled and skilled occupations and training programs to which functionally illiterate adults aspire.
5.	Products:	A description of the literacy requirements necessary to hold a job in each of ten occupations and the corresponding requirements necessary to succeed in vocational training programs which prepare individuals for each of those occupations is provided. A booklet for each of the ten jobs was prepared.

INTRODUCTION

This project was undertaken in response to a need, expressed by adult basic educators and counselors, for information about the specific literacy skills necessary for success in several occupations. The occupations studied had been identified as desirable careers during informal interviews with adults who were enrolled in basic education programs in the Lafayette, Indiana area. Employment counselors and officials of the Office of Career Development confirmed that the occupations identified for study were appropriate. Because Greater Lafayette offers a wide range of occupational and training opportunities, the project staff was able to study both job sites and vocational training sites for each of the following occupations: account clerk, automotive mechanic, draftsman, electrician, heating and air conditioning mechanic, industrial maintenance mechanic, licensed practical nurse, machine tool operator, secretary, and welder.

Purpose and Audience

This report provides descriptive and instructional information to adult educators at two levels. Factual data are presented in Parts I and II for use in decision making by program developers, administrators, lead teachers, and counselors. Part III presents instructional methods and materials and is meant for use by adult basic education teachers. Members of both groups may be interested in the entire report, but in preparing it the project staff attempted to address the needs of the two audiences separately.

Procedures

To identify reading, writing, speaking, listening, mathematics, and other characteristics which are necessary for success both on the job and in the training program, three job sites and three vocational college courses were studied.

Required reading materials from each of the six settings were evaluated using two widely used readability formulas, the Dale-Chall Formula and the Fry Readability Graph. Readability estimates were computer assisted. A minimum 2000 word sample of written language was taken from each site. Special considerations and problems related to reading the technical materials were identified, and the relative use of reading as a work tool and as a learning tool was determined.

To identify speaking and listening requirements, one hour samples of oral language were recorded at each job site and in each vocational college course. Language recorded at each site was rated for its technical and formal qualities, and computer-analyzed to assess vocabulary and syntax. Written and oral language samples were used to develop the Key Technical Vocabulary List found in Appendix A. The combined language samples from all occupations studied were used to develop the Highest Frequency Word List found in Appendix B. A summary of the literacy requirements for all ten occupations studied is found in Appendix C.

Writing samples were obtained at each of the six sites and used to determine the nature of written communication demands on the job and in the vocational training program.

Mathematics demands were determined through surveys of materials from the job sites and classrooms. Instructors and supervisors

responded to a questionnaire about the specific mathematics skills necessary for job and/or training program success.

Important non-literacy characteristics were identified by supervisors who completed a rating scale which asked for their estimate of the importance to job success of such factors as cooperativeness, reliability, and attitude toward work.

The following sections of this report are organized according to the requirements of the job, the requirements of the training program, and instructional recommendations.

PART I

REQUIREMENTS ON THE JOB

Job Sites Studied

At each of three separate job sites the literacy demands placed on one licensed practical nurse (LPN) were studied. Reading, writing, oral language and mathematics were the specific literacy skill areas examined. The roles of the LPNs who participated in the study were similar. Each worked on the staff of a hospital ward providing care and treatment to hospitalized patients.

From each job site, examples of the reading, writing, and mathematics tasks done on the job were obtained. Samples of the oral language required on the job were collected by tape recording a randomly chosen one-hour period of on-the-job verbal interaction. At each job site, the LPN's immediate supervisor completed a questionnaire which was concerned with the importance of eleven worker characteristics. Supervisors were also asked to estimate the amount of time per week spent on mathematics and reading related tasks and to identify the mathematics skills necessary to job success. The LPNs themselves described the nature of their reading tasks through a brief questionnaire which was designed to determine how reading was used on the job.

Reading Requirements

A high level of reading skill was required of the LPNs on the job. Supervisor estimates of the amount of time per week spent on job-related reading ranged from five to eight hours. It was difficult for the supervisors to estimate the total amount of time spent on reading because it was used very frequently for short periods of time rather than during long uninterrupted sessions. Distinctly different types of reading tasks were observed within each job site. LPNs read from patient charts and card files most frequently, but time was also spent reading from reference books and procedures manuals.

The styles of writing encountered in charts and card files and manuals were abbreviated and similar to the language used in telegrams; non-essential words were omitted to save space. The information content of these materials was difficult, and careful reading was essential. Reference books presented information in expository style similar to that of science textbooks. Procedures manuals usually presented information in the form of directions, in a step-by-step format with many diagrams and illustrations coordinated with the written text. The styles of writing found at the LPN job sites are presented in Example I.

EXAMPLE I

Styles of Writing From LPN Job Sites

A. A Treatment Procedure

Method	Key Point:
1. Measure the patient's girth at the crest of the ileac and apply proper size belt.	Apply pelvic traction so that the lower portion of the belt is at or slightly below the greater trochanter.
2. Position patient flat on back with bed wither flat, in Fowler position, or Williams's position, as ordered by physician.	

B. Reference Book Style

"Attached to the trachea, this gland is located beneath the larynx and above the sternum: It is U-shaped (two lobes connected by an isthmus) and secretes a hormone called thyroxine." (Culver, 1974, p. 146)

The readability of the job-site reading materials, examined through computer analysis, was consistently high. The readability estimates shown in Table I, below, are the results of the Dale-Chall Formula and the Fry Readability Graph. Estimates are presented in ranges of difficulty because of variations in the materials sampled at each job site, and because the results of the two formulas did not precisely agree.

TABLE I

Readability Estimates for Job-Site Reading Materials

Job Site One	10th to 12th grade level
Job Site Two	12th grade to third year college
Job Site Three	10th to 12th grade level

Frequent task repetition and familiarity with specialized technical vocabulary and styles of writing may have offset the apparent difficulty of on-the-job reading materials. The implications of this possibility are discussed in Part III of this report.

Special Reading Related Problems and Considerations

LPNs who participated in the study were most often required to use reading in finding information in charts and files and in following procedures provided by manuals. Thorough, accurate reading was demanded. In addition, facility with the abbreviated style of writing presented in Example I-A was essential.

Use of Reading on the Job

Each of the LPNs who participated in the study completed questionnaires concerning her use of reading on the job. The questionnaire results showed that reading was used predominantly as a tool for accomplishing work. The LPNs reported that they carefully read the same materials daily in order to note changes in patient status. Information such as this was remembered for the duration of a work shift. The administration of medication to patients likewise required careful reading in order to guard against mistakes.

While 'reading to do' (Sticht, 1977) was the predominant application of reading on the job, the LPNs also reported reading descriptions of medications and their effects and reading about diseases and their identification and treatments. Thus, 'reading to learn' (Sticht, 1977), while not used as frequently as reading to do, was important to job performance. One LPN explained that she read about diabetes when she

had to plan a diabetic patient's diet. She noted that because she read and understood the information, she would remember it for a long period of time. Yet, she stated that if she had to plan the diet of another patient the following week, she would have to read the same material again because "It's always good to refresh your memory about diabetes." This statement is an indication of the cautious attitudes observed in reading and other areas of job performance by LPNs.

Writing Requirements

The writing styles used by LPNs were typical of the styles of writing found on the charts, files, and procedures manuals discussed in the section on reading requirements above. Grammatical completeness was not demanded, but accurate communication of essential information was critical. The excerpt presented in Example II is typical of the style used in patient charts and files. The examples quoted, however, are taken from questionnaires completed by the LPNs in order to avoid confidentiality conflicts.

EXAMPLE II

On-The-Job Writing Requirements

Question: Why must you read the material?

Answer: "understand diabetic; clinitest teaching; knowledge of diabetic (full understanding)"

Question: What other helpful material have you read?

Answer: "diet books, nursing manuals on diabetes"

LPN's job site writing requirements, like their reading requirements, involved high levels of precision in communication. Clarity and conciseness of expression were demanded. Standard grammatical form, such as complete sentences, was not generally used.

Mathematical Requirements

Two levels of mathematics skills were required of LPNs on the job. At the first level, only basic arithmetic processes of addition and subtraction were necessary. This level of skill was required, according to supervisors, for all job routines except the dispensing of medication. In order to be certified to dispense medication, the LPNs were required to receive special training which involved the use of mathematics through the level of algebra. Facility with processes involving the decimal system, fractional numbers, and measurement was necessary for LPNs at this level.

Estimates of the amount of time per week spent on mathematics-related work ranged from two and one half hours to five hours for both LPNs who dispensed medication and for those who did not.

The mathematics requirements of the LPN job sites studied were basic or moderately sophisticated, depending on individual certification to dispense medication. Thoroughness and accuracy, even when basic addition and subtraction of whole numbers were necessary, were imperative.

Oral Language Requirements

The recordings of on-the-job language revealed that the vast majority of language produced by LPNs in their work occurred while

they were providing care to patients. The style of language used was typically informal whether its purpose was to facilitate a procedure or to interact in a friendly way with the patients. Example III contains an excerpt from an interaction typical of LPNs on the job.

EXAMPLE III

Typical LPN On-The-Job Language

LPN: "What we're here for is to help you. Okay?"

Patient: "I like to help myself."

LPN: "Well sure, but we're available to get you a blanket and assist you. And everything you need. You want to turn a little bit and I'll straighten your blanket. They'll be bringing breakfast around at about five or ten till seven."

While the tape recordings did not reflect it, LPNs were expected to listen carefully and to follow the directions of their supervisors. In communication of this type the incidence of specialized medical terminology was high and required application of the LPN's knowledge of medicine and hospital procedures.

Key Non-Literacy Characteristics

Supervisors of the LPNs who cooperated in the study rated each of the following characteristics as very important to job success as an LPN: cooperativeness, job knowledge, good record of attendance, positive attitude toward work, reading ability, ability to communicate

through speaking and writing, and ability to follow both spoken and written directions. Important characteristics added to the list were adaptability and physical fitness. Mathematics skills were rated as moderately important by the supervisors.

The fact that several non-literacy factors were rated to be at least as important to job success as reading and mathematics skills suggested implications for ABE instruction which are discussed in Part III of this report.

PART II

REQUIREMENTS OF THE VOCATIONAL TRAINING PROGRAM

Courses Studied

The reading, writing, oral language, and mathematics requirements of three courses in a vocational college licensed practical nurse training program were studied. The courses were Basic Science; Nursing Techniques III, which focused on diet regulation; and Nursing Techniques IV, which covered administration of therapeutic agents and the role of LPNs in therapy. Each course was determined by the school administration to be representative of the LPN training program as a whole. In other words, the literacy demands placed on students in other courses of the program in practical nursing were judged to be about the same as those presented here.

Each of the courses studied involved both lecture and practical experience. Many opportunities were provided through which students could relate abstract concepts presented through lectures and readings to concrete objects and experience.

Reading Requirements

Literacy skills are typically used more often in training programs than they are on the job. Greater training program use of

literacy skills, particularly reading, is due to the need for presentation of large quantities of information in a limited period of time.

In the field of practical nursing similar literacy skills are required in both the training and job settings. Students and LPNs on the job were required to use reading as a work tool and as a learning tool. In the training program students spent more time reading than was spent by LPNs on the job. Reading to learn was the predominant application of reading in the training program. On the job, reading was used primarily as a tool for getting work done. Instructors' estimates of the amount of time spent reading on the job averaged 10 hours per week for the three classes studied.

The writing style of LPN training program course materials was similar in style to that found at the job sites. The style of writing used in the textbooks examined was formal and/or technical, deperding on the course, and was similar to the expository style found in textbooks in science-oriented subjects at the high school and college levels. The writing style of instructor-prepared handouts, workbooks and manuals was similar to the abbreviated style observed in charts, files and manuals at the job sites. Example IV presents excerpts from course materials which illustrate typical writing styles.

EXAMPLE IV

Writing Styles Found in LPN Training Program Materials

A. Formal/Technical Expository Style

"Specialized masses of tissue in the heart wall form the conduction system of the heart, regulating the order of events. Two of these are called nodes, while the third is a branching structure called atrioventricular bundle. The sinatorial node is located in the upper wall of the right atrium and acts as a pacemaker." (Memmler and Wood, 1977, p. 160)

B. Abbreviated Style

OBJECTIVE

Define anatomy and physiology

Outcome:

State definition of anatomy and physiology

OBJECTIVE

Explain the body systems

Outcome:

1. State the ten body systems.
2. Define, simply, the ten body systems.
3. View the body as an integrated unit.

The levels of readability of the materials required in the training program were higher than the levels of materials from the job sites (see Table II). It should be noted, however, that only the most frequently used job-site reading materials were examined and that

infrequently used materials, such as guides to pharmaceuticals, were probably at least as difficult as reading materials used in the vocational training program. It is probable that materials used at the hospital job sites, such as pharmaceutical guides, are at least as difficult as those examined from the vocational training program.

The effect of using materials with high readability levels to introduce difficult concepts to students was purposefully offset by the instructional staff members who included large vocabulary and concept development components in their courses.

TABLE II

Vocational Training Program Readability Levels

Course One	12th grade to third year of college
Course Two	college to college graduate
Course Three	12th grade to college graduate

Readability formulas do not account for factors such as personal motivation and familarity with subject matter, which are known to be related to reading comprehension and memory. The implications of these factors for ABE reading instruction are discussed in Part III, Instructional Recommendations.

Special Reading-Related Problems and Considerations

Reading to learn was the predominant use of reading in the training program, whereas finding information and following directions were the most frequent on-the-job applications of reading. Neither

reading to learn nor reading to do, however, was used exclusively in the training program or on the job.

Although reading to obtain and remember information was predominant in the training program, textbooks contained illustrations, tables, and figures similar to those observed in reference books found at the job sites. Also, training program workbooks and laboratory materials which presented activities through sets of sequential directions were similar to materials found at the job sites (see Example I).

Uses of Reading in the Vocational Training Program

As noted previously, reading was used in the LPN training program both as a tool for accomplishing work and as a learning tool. The proportion of time spent using reading as a work tool was higher on the job, while in the training program more time was spent reading to learn. In both settings, careful reading was required. Because different skills are emphasized in these two uses of reading, reading to do and reading to learn are discussed in separate sections of Part III.

Writing Requirements

The writing requirements of the LPN training program were similar to those observed on the job. Responses to questions were judged more by their information content than by their grammatical "correctness." Workbook exercises called for single words or brief phrases in response to questions. The style of writing required was abbreviated, much like that used in on-the-job communication in the hospital wards. Reasonable legibility was required in order to assure clear

communication, but a wide range of penmanship was tolerated.

Mathematics Requirements

None of the instructors surveyed reported that mathematics skills beyond addition and subtraction of whole numbers were required in their courses. It was stated, however, that in order to be certified to dispense medication students were required to pass a pharmacology course in which mathematics skills up to and including metric measurement and algebra were called for. At all levels where mathematics skills were required, precision was essential, especially when tasks involved medication or diet.

Oral Language Requirements

The style of English used by students in the training program was consistently informal or conversational. The language style used by instructors was typically more formal than that of the students.

Language skills required in the training program were often related to obtaining information through listening. Note taking skills were important. The ability to refer to textbook illustrations during lectures was often called for. Example V presents an excerpt from a vocational training program lecture which involved students in careful listening and note taking.

EXAMPLE V

Excerpt From a Training Program Lecture

"During our last class we were discussing disorders and diseases of the female reproduction system. Today, I'll continue on this subject. We had finished benign tumors, and we had talked about tumors of the uterus. So we are going on now to talk about malignant tumors of the reproduction organs. And of course, the most commonly found of the malignant tumors would be cancer of the cervix, cervical cancer."

The above example illustrates one of several learning aids that instructors in the nursing program used in teaching their courses--reviewing previously covered information in order to prepare the students for new information. The importance of providing students with such organizational cues is also relevant to reading and is discussed under the heading, Notes on Teaching About the Structure and Organization of Text, in Part III.

PART III

INSTRUCTIONAL RECOMMENDATIONS

Project Overview

The levels of reading skill required of LPNs on the job and of students in the vocational training program were high. Somewhat higher levels of reading skill were required in the training program than on the job. An aspect of reading, required in both the school and hospital settings, was careful attention to detail.

On the job and in the training program, reading was used both as a tool for accomplishing work and as a tool for learning information. Reading to do was predominant on the job where LPNs spent short, but very frequent, periods reading or reviewing patients' charts and files. Information contained in these materials was usually written in an abbreviated, telegram-like style. Less frequently, LPNs spent time reading from reference books in order to learn about medications and diseases which had current relevance.

In the vocational training program students devoted more time to using reading as a learning tool. The references and textbooks involved in reading to learn were, like on-the-job reference materials, usually written in an expository style similar to that found in secondary school and college-level science textbooks.

Writing on the job and in the training program required clear, concise communication of information. Standard grammatical style was not necessary. Instead, entries in charts and files were written in a style which left out nonessential words. For instance, the information contained in sentence A of the following example might be written in the condensed form of B.

EXAMPLE VI

LPN Writing Style in Contrast to Standard Style

A. "Mr. Smith's blood pressure was high this morning at 7 o'clock. It measured 180 over 120."

B. 3/25/79, 7:00 AM, T. Smith--BP 180/120

The level of mathematics skills required in both environments depended on the responsibilities of the individual. If certification to dispense medication was held or sought, the LPN or student needed mathematics skills up to and including algebra. If certification to dispense medication was not held or desired, only facility with basic arithmetic processes of addition and subtraction of whole numbers was required. Accuracy was a critical aspect of mathematics no matter what level of skills was required.

Oral language used on the job was primarily informal and conversational in style and occurred most often in interactions with patients. Such interactions had a cheerful, positive tone, although patient expressions were often characterized by complaint. Listening focused on patient needs. Supervisors noted that ability to follow spoken

directions was important to job success. Thus, although interactions of this type were not recorded, listening to accomplish assigned tasks was necessary on the job. It seems likely that interactions involving listening to instructions occurred at certain times of the work day, such as at the beginning of a shift.

Listening skills were emphasized in the training program, as students were required to absorb information from lectures. Although the organization of the instructors seemed to aid learning, good note taking skills were important.

Non-literacy characteristics, which were rated as very important to job success by supervisors, were identified. Included in the list were cooperativeness, good attendance, positive work attitude, and the ability to follow directions. All of these qualities were rated at least as high as reading ability. All were rated higher than mathematics ability.

A brief summary of how the literacy requirements of the LPN compare to those of the other nine occupations studied is found in Appendix C.

Organization of ABE Lessons

The recommendations which follow are meant to aid teachers and tutors in designing streamlined lessons which develop literacy skills while imparting job-related knowledge. The majority of the literacy information studied in connection with LPN jobs and training programs was related to reading. Reading demands were found to be high, and even when mathematics and writing skills were used by the LPNs and

students, they were used in conjunction with reading. This section, therefore, presents background information and a method of organizing ABE lessons which emphasizes reading. Background information provided deals with the teaching of vocabulary and teaching about text structure and organization. The lesson format is based on a directed reading activity (DRA) and includes vocabulary and concept development, sentence and organizational structure, silent reading, and skill development.

The guiding principle of a DRA method of lesson organization is that words, concepts, and skills must be introduced and practiced in situations and materials that are true to life. For example, words, sentences, tables, and illustrations should be similar to those used on the job or in the training program. It may be possible to teach an interested ABE student the words on the Key Technical Vocabulary List in isolation, but a far better practice is to introduce and practice such words in contexts like those found in occupational reading materials.

In the case of ABE lessons, there may be a wide gap between the reading requirements of occupational materials and the reading abilities of the student. Materials which parallel those found on the job and in the training program can be developed by teachers and tutors, if time permits. Through paraphrasing sections of textbooks, reference books, and manuals, the readability of occupational materials can be reduced so that literacy skills and job-related knowledge can be developed simultaneously.

The value of a DRA approach is that it allows the use of any appropriate reading material in job-related reading skill development programs.

Notes on Teaching Vocabulary

The vocabulary of practical nursing is highly specialized, technical, and intimidating. There are, however, many key concepts and words which share roots, prefixes, and suffixes. Mastery of word relationships is an important step toward rapid vocabulary development.

The specialized technical words of the Key Technical Vocabulary List should be taught to ABE students interested in entering the practical nursing field so that both the words and their meanings are recognized. This implies that the words will be taught in a meaningful context. Because many words might be related to the same concept, learning can be enhanced by teaching such words together. For example, the concept of inflammation is expressed in medical terminology by the suffix, -itis. Thus, words such as mastoiditis, menigitis, bronchitis, and tendonitis might be taught together in a lesson which emphasizes how they are related. For ABE lessons, a brief paragraph or two could be composed to provide a written context in which to practice reading the words.

Two types of specialized vocabulary words occur in specialized fields such as practical nursing. One type of word is unique to the specific field. The word "systolic" has a very specific meaning to LPNs and others in the medical professions, but persons outside of that field may have never encountered the word. In teaching words

such as "systolic" to ABE students, an illustration of its meaning would be essential.

A second type of word which needs attention in ABE lessons is one which has a common meaning in everyday communication, but which also has a specialized technical meaning. The word "traction" is usually used to refer to the contact of shoes or tires with pavement. In the medical field, however, "traction" refers to a procedure used in the treatment of fractures. Multiple meanings like these should be pointed out during reading lessons.

It is important for ABE students to be introduced to common high-frequency words and specialized vocabulary words via contexts which are similar to those found on the job and in the training program. As noted previously, this practice develops basic job-related knowledge and reading ability.

The following are suggestions for teaching vocabulary:

1. Pair the word to be taught with the concept or object that it refers to.
2. Introduce the word using an approach which focuses student attention on the word.
3. Be sure that the new word is read in context very soon after it has been taught.
4. Use the general rule that four to six new words per lesson be introduced. Learning and recall are typically most efficient when the number of words taught is in this range.
5. Review vocabulary words frequently.

Sources of job-related vocabulary words and concepts are included in the books cited in the bibliography of this report. The style and level of writing in the listed materials is often highly technical, thus, teacher time could be devoted to preparing lower readability materials which parallel high-level passages.

Notes on Teaching About the Structure and Organization of Text

The above suggestions on teaching vocabulary words emphasize meaning; words have little use outside of a meaningful context. In the field of practical nursing even solitary words on a chart or file have a meaningful context to trained, experienced individuals.

In reading it is important to be aware of special patterns of organization used by writers. Formal technical reading materials are organized differently from the short stories and novels used in teaching reading to most Americans. The expository style of writing used in textbooks and other specialized or technical materials is different, at several levels of comparison, from the narrative style of stories and novels.

At the sentence level, ABE students should learn that expository style often relates cause and effect. Sometimes this relationship is clearly stated as in the sentence in Example VII-A.

EXAMPLE VII

Stated and Unstated Cause and Effect Relationship

A. Because of her excellent condition, she survived the fall.

B. She was in excellent condition. She survived the fall.

Often, however, the relationship is not stated, as in Example VII-B. In such cases, readers who are not expecting cause and effect connections may miss them.

At the paragraph level, writers of expository material often use a format which states the main idea in the first sentence. The last sentence summarizes the paragraph and may connect it to a paragraph that follows. Comprehension and learning can be improved when readers are aware of this organizational technique.

At the chapter level, expository material may contain many valuable aids to efficient reading. Key words are used as headings which introduce important sections. Pictures, diagrams, tables, and figures are used to illustrate important ideas. Introductions and chapter summaries are also available as aids to readers who know how to use them.

ABE students should learn about style factors such as these and use them to enhance comprehension. Efficient readers use their knowledge of expository style to organize their reading. Awareness of the use of cause and effect makes them sensitive to such relationships. Knowledge of paragraph and chapter organization is used to develop a 'mind set' which is helpful in organizing and remembering important information. Reader-composed questions based on paragraph lead-sentences, headings, pictures, and other graphic aids help readers organize, comprehend and remember what is read.

A directed reading activity, described in the next section, is a system which enables the ABE student to become efficient in using organizational factors as aids to comprehension and memory.

Directed Reading Activity

This system of preparing for efficient reading may be used with individual students or with groups. In groups, it requires very little class time to prepare students for reading assignments. For both individual and group use, it has been demonstrated to increase reading efficiency and comprehension.

After a review of previously taught, related concepts and assignments, the below procedures should be followed:

I. Develop Readiness for Reading the Assignment.

Purpose: Motivate
Set purposes for reading
Develop vocabulary

Teacher role: Ask Questions -

How familiar is the subject matter and vocabulary to your student?

Teach New Vocabulary -

Be concrete: write out the words as you introduce them. Use examples, such as objects or pictures, point out word relationships; i.e., cardiograph and cardiovascular relate to cardiac - heart. Have students write the words as wholes to verify that learning has occurred.

Ask Questions to Stimulate Interest -

Focus on titles, pictures, graphs. Relate an anecdote from your own experience or one your students might have had.

II. Direct the Silent Reading of the Assignment

Develop questions from sub-headings, graphs, pictures, and tables. Try to focus on relationships in the assignment. In textbooks, useful questions are often provided by the authors. Use primary fact questions at first, then add inferential and interpretive questions.

Have pupils read silently from 5 to 20 minutes to find the answers (keeping questions in mind as they read). Encourage students to ask for help when they are confused. Writing questions down in shorthand form is a good practice when reading is done outside of class.

III. Discuss Student Answers to Questions

Do not restate the questions unless necessary. Students need to remember the questions, or they lose the purpose for reading.

Ask higher level questions to develop comprehension (have student(s) interpret, draw conclusions, and make inferences as well as recall facts).

IV. Reread as Necessary

When answers demonstrate confusion, have the student reread the appropriate small section to determine the reason for the confusion.

V. Follow-up and Skill Development

Confusion or lack of comprehension may signal a need for extra work on vocabulary, concept building, or word recognition skill.

In this phase of the lesson important mathematics and other skills can be related concretely to the reading assignment.

REMEMBER:

The DRA is a system, a routine, that you want your student(s) to learn to use independently. Remind your students of this - tell them why you use a DRA system. It will help them now and in their future study.

Reading to Accomplish Work

The term, reading to do, has been used in research and development projects done for the U.S. armed forces (Sticht, et al., 1977).

Reading to do refers to the use of reading for the purpose of getting work done. It involves following written directions and reading to find information which will be used immediately. Such information need not be learned or remembered. Looking up telephone numbers; finding information in a policy manual; or finding important data in a table, chart, or figure are examples of reading to do. Preparation of ABE students for reading-to-do tasks can be incorporated in a directed reading activity lesson.

When lesson materials contain occupationally relevant concepts, ABE students are given important background information which will make higher level training easier. Therefore, lessons should employ materials which are similar in structure and content to those found on the job or in the vocational training program. Paragraphs, tables, charts, and figures from on-the-job or instructional materials might be used verbatim. Alternatively, such materials might be paraphrased and reduced in difficulty to match student abilities.

Given appropriate materials and a period of orientation to them, the structural and organizational features of the table, chart, figure, paragraph, or chapter should be pointed out to the student (see Notes on Teaching About Structure and Organization of Text). This is essentially the first step of the DRA described above. When the materials have been introduced, the student should be directed to find a particular fact in the material. In subsequent lessons the difficulty of information-finding tasks should be increased.

Skill in following written directions can be developed using the DRA system and materials similar to Example VIII. Initial activities

should contain only one or two steps to follow.

EXAMPLE VIII

Written Directions

TAKING TEMPERATURES

1) Wash hands. Assemble equipment, take to bedside.
2) Explain procedure to the patient.
3) Cover probe with disposable plastic sheath and remove outer paper.
4) Routes of measurement:
   A. ORAL - Place probe in heat pocket at base of tongue on either side...(St. Elizabeth's Hospital Nursing Service Administration, 1977, p. A IV-I).

In information-finding lessons, the emphasis should be on understanding and careful identification of the required fact. Likewise, in lessons on following directions, understanding and careful execution of the required steps must be emphasized.

Reading to Learn Information

Skill in learning printed information for future use is very important in vocational training programs. The reading skills necessary for reading to learn (Sticht, et al., 1977) are taught and systematically practiced in directed reading activity lessons.

That is, the use of previewing, attention to graphic and contextual information, and the organizational factors discussed in Notes on Teaching About the Structure and Organization of Text, above, should be practiced and learned during each DRA lesson. Questioning and rereading, also components of the DRA, reinforce important learning skills.

Sources of materials for use in reading-to-learn lessons, like those employed in reading-to-do lessons, should be occupationally oriented (See Bibliography). ABE students who receive reading instruction through job-related reading materials not only develop reading skills, but gain important job knowledge as well.

Counseling the ABE Student

ABE students should be made aware of the importance of reliability, cooperation, ability to follow directions, and other factors noted in Part I of this report. On the basis of the responses of supervisors surveyed in this study and previous research (Sticht, 1974), it seems that such characteristics may contribute more to job success than do reading and mathematics skills. Role-play activities which involve consideration for others and following directions may be a valuable part of ABE lessons designed to prepare adults for employment.

The literacy demands of LPN jobs and training program courses were high. It is, therefore, important that teachers, tutors, and counselors consider the facts presented earlier in this report, the individual students' levels of motivation, and literacy skill development before beginning to prepare the student to enter a practical

nursing training program.

This does not mean that students with low literacy skills should be discouraged from preparing for a practical nursing career. It does suggest, however, that an early and realistic estimate be made of the time and effort required to reach the goal of employment or formal training.

Summary

The reading demands of LPN jobs and training program courses were found to be high. It is probable that individual experience and familiarity with specialized information reduces the perceived demands of job and training program tasks. The extent of such a reduction, however, is not known.

It was observed that the vocational training program for practical nursing provided students with experiences that were very similar to on-the-job tasks. Reading materials from the training program presented important basic occupational concepts through texts which were more difficult than materials found at the job sites. It was noted that instructors employed strategies such as integrating vocabulary and concept development into their lectures in order to offset the difficult textbooks necessary to their courses.

Instructional recommendations emphasized the development of reading skills. Other literacy and non-literacy requirements were recognized as important, but it was clear, even in cases where moderately high level mathematics skills were necessary, that good reading skills, also, were essential.

The recommended approach to ABE reading instruction was a directed reading activity (DRA) because it is systematic, provides for essential skill development and practice, and permits the use of any appropriate reading material. Suggestions were presented for teaching vocabulary and on the use of important structural and organizational factors which are related to reading comprehension and memory.

Two uses of reading, reading to do and reading to learn, were discussed separately because the skills they require are distinct. Reading to do requires the ability to find information for immediate use; long-term memory is not necessary. Reading to learn requires awareness of organizational factors which aid learning and remembering.

Non-literacy factors were discussed in the section, Counseling the ABE Student, because on-the-job supervisors rated several factors such as attendance and cooperativeness to be at least as important to job success as were reading and mathematics ability.

Finally, it was recommended that, in using the information and recommendations presented in the report, ABE teachers should be well acquainted with the occupational interests and motivation as well as the literacy skills of their students. The literacy demands of practical nursing, on the job and in training program courses, are high. Some ABE students, whose skills are well below those required, may be unable to develop the literacy skills necessary for success within a reasonable period of time. Such students might be counseled toward other occupations.

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APPENDIX A

TECHNICAL VOCABULARY LIST

This list is based on the total oral and written samples of the language of licensed practical nurses both on the job and in the training program. Words included in the most frequent 1000 words of the Kucera-Francis list (based on adult language) have been deleted. The list was also edited to remove numerals; labels; names of people, places, products, and companies; contractions and possessives; and colloquialisms resulting from the oral language samples.

Some words included in the list are relatively uncommon words that occurred in the total language sample and are not necessarily technical terms. Thus, the list should be treated as a source rather than a criterion. The 50 most common words have been marked with an asterisk.

Total Sample Words = 24964

Different Words = 3955

abbreviate
abdomen
abdominal
abides
abilities
ability
abnormal
abnormality
abortion
abortions
abscess
absolutely
absorbed
absorption
accept
acceptable
acceptance
accepted
accepting
access
accessory
accident
accidental
accidents
accommodating
accompanies
accompany
accomplish
accounted
accredited
accumulating
accurate
achieve
achieved
acidic
acidosis
acids
acoustic
acquire
acted
actions
active
acts
actual
acute
add
adding
additive
additives
adds
adeno
adend
adequate
adequately
adhere
adhesive
adjacent
adjoining
adjust
adjustment
administer*
admission
admit
admitting
adrenal
adult
adults
advance
advantage
advantages
adverse
advise
aerosol
affect
affected
affecting
affection
affiliated
affix
afraid
aged
agencies
agency
agent
agents
ages
agitation
agree
aids
airway
alcohol
alcoholism
alert
algia
aligned
alignment
alimentary
alkaline
allergen
allergens
allergic
allergy
allow
allowed
allows
alter
altogether
alveolar
alveoli
ambulate
ambulating
ameliorating
amino
amounts
ampule
anal
analgesic
analyze
analyzer
anatomical
anchor
anchored
anchoring
ancient
anemia
anesthesion
anesthetic
aneurysm
angiograph
angle
ankle
annually
anorexia
answers
antepartum

anterior
anteriorly
anthologic
antiabortion
antibiotic
antibodies
anticipate
anticoagule
antiseptic
anus
anvil
anxiety
anybody
anymore
anything*
aortic
apart
appeal
appearance
appears
appended
apple
appliance
appliances
application
applies
apply
applying
appropriate
approximate
art
aquamatic
aqueous
argue
arises
arm
armchair
armed
armlets
arranged
arrangement
arranges
arrhythmia
arrives
arterial
arteries
arteriosclerosis
artery
articles
artificial
ascending
ascites
aseptic
aside
aspects
aspirin
assemble
assess
assessment
assigned
assist
assistance
assisting
assists
assume
assumes
assuming
assurance
assure
assured
atheist
atheists
atmosphere
atria
atrophy
attach
attached
attachment
attain
attend
attendance
attitudes
auditory
automatic
automatician
avoid
avoided
avoids
awake
awaken
aware
awhile
axial
axilla
axilliary
axis
baby
bacteria
bacterial
bacteriostasis
bag
bags
balance
balanced
band
bandage
bank
baptism
bar
bare
barely
barks
barrel
bars
base
basically
basin
bath*
bathe
bathing
bathroom
baths
beat
beats
becomes
becoming
bedding
bedmaking
bedpan
beds
bedside
begin
begins
begun
behave

behavior
belief
beliefs
believed
bell
belly
belt
bend
beneficial
benefit
benign
bent
benzine
berries
besides
bet
betaine
bevel
bile
billionths
bills
bin
biopsy
birth
bit*
bladder
blanket*
blankets
bleed
bleeding
blinking
bloodletting
bloodstream
bloody
blurry
boards
bodies
bodily
bone
bones
bottle
bottles
bottom
bowel
brace
braces
brachial
braid
braided
braiding
braids
brain*
break
breakdown
breakfast
breast
breath
breathe
breathing
bridgwork
briefly
bringing
brings
board
broken
bronchi
bronchials
bronchioles
bruise
brush
bubbles
bubbling
buckets
build
built
bundles
burned
burning
burns
buttocks
button
cabinet
cabinets
caking
calibration
calorie
calories
canal
canals
cancels
cancer
cannula
cannulas
cans
canvas
cap
capable
capacity
capillaries
capsule
carbohydrate
carbon
carcinoma
card
cardiac
cardiovascular
cared
careful
carefully
caring
carotid
carrier
carries
carry
carrying
cart
cartilaging
carts
cast
catch
catching
catheter*
catheterize
caught
caused
causes
causing
caution
cavities
cavity
cease
ceiling
dell
cells*

cellular
centers
cerebral
ceremony
cervical
cervix
chair*
chairs
challenge
challenged
chamber
changed
changing
chapel
chapter
chapters
characteristic
charged
charges
charging
chart
charting
check*
checked
checking
cheek
chemical
chemosensis
chemotherapy
chest
chilling
chocolate
choking
chronic
chronically
chronological
churned
cigarette
cilia
circle
circles
circuits
circular
circulation
circulator
circumstance
circumvent
cirrhosis
cisternal
civilized
claims
clamp
classified
classmate
clean*
cleaned
cleaning
cleanliness
cleanse
clears
clergy
clergyman
cling
clinical
clockwise
closely
closer
closes
closeup
cloth
clothes
clothing
clubfoot
clues
clumping
cluster
clusters
cochlea
code
coffee
collapse
collar
collateral
collection
colon
colored
colors
colostomies
colostomy
column
coma
comatose
comb
combat
combed
combination
combine
combined
combining
comfort
comfortable
commands
commercial
commode
commodes
commonly
communicate
communion
comparison
complain
complained
complement
completed
complex
complexity
complicate
complication
component
components
composed
compress
compression
combination
concentrate
concept
conception
concepts
concern
concerning
concerns
condition*
conducive
conduction
cones

confined	contain	cord	cradle	cysts
confirmation	container	cords	cranial	damage
conform	containers	cork	cranium	damaged
confused	containing	corn	cream	danger
congenital	contains	cornea	credit	dangerous
congestion	contaminate	corners	crest	date
conjunction	content	correct	crimping	dated
conjunctive	contest	correctable	crippled	dawn
connect	continues	corrective	crippling	deafness
connected	continuing	correctly	crisis	dealing
connecting	continuous	correlation	critical	dealt
connection	contract	corridor	crooked	decides
connects	contraction	corridors	cross	decrease
conscious	contraindicate	corset	croupette	decreased
consciousness	contrast	corsets	crowded	decubitus
consent	contribute	cotton	crusting	deems
consented	contributing	cough	crusts	deeper
consents	controlled	coughing	cup	defatting
consequently	controlling	counseling	cups	defecation
considerate	controls	counselor	curable	deficiency
consist	convenience	count	cure	deficient
consists	convenient	coupled	curved	defining
constant	cool	courts	cutdown	definite
constantly	cooled	cover	cute	definitely
constipate	cooling	covering	cuts	definition
constipation	coordination	covers	cycle	deformities
contact	cope	cow	cyst	defrost

degrees	desires	difficulties	discovery	dosage
dehydration	desirous	diffusion	discuss	doses
delay	destitute	digest	discussed	downward
delayed	destroy	digestion	discussing	dozen
delivery	destroyed	digestive	discussion	drag
deltoid	destruction	dilated	disease*	drainage
demanding	detail	diluent	diseases*	draining
demands	details	dim	disinfect	drains
demonstrate	detect	dimes	disintegrate	drapes
dentures	detecting	dimples	disks	drastic
depend	develop	dinner	disorder	draw
dependency	developing	dioxide	disorders	drawer
dependent	develops	diphtheria	displays	drawsheet
depending	deviation	directed	disposable	dressing
depends	devices	directing	dispose	dried
deposited	diabetes	directions	distended	drink
depress	diabetic	directives	distends	drinks
depressed	diagnose	directs	distilled	drip
depression	diagnosed	dirty	distinguish	drop
depth	diagnosis	disabilities	distortion	dropped
derivative	dial	disbelieve	disturbance	drops
dermis	diarrhea	discard	divide	drug
descending	diastole	discharge	divided	drugs
designated	die	discharged	dividing	drum
desirable	diet	discomfort	doctor	dry*
desire	dietary	discontinuous	doctors	ducts
desired	differ	discourage	dormant	duties

duty
dying
dyscrasia
ear*
eardrum
earliest
ears
earthworm
ease
easier
easiest
eat
eaten
eating
edema
edge
effectively
eggs
eight
eighth
eighty
elapses
elasticity
elderly
elective
electric
electrical
electrocard
electrolyte
electronic
element
elevated
elevation
elevator
elevators
eleven
eliminate
eliminated
elimination
embryo
emerged
emergencies
emergency
emotion
emotional
empathy
emphysema
employed
emptied
empty
enabled
enables
enacted
encased
enclosing
encounter
encourage
encourages
ending
endocrine
endometriosis
endometrium
endoplasmic
ends
enema
enemas
energy
engorged
engulf
enlarged
ensues
ensure
enter
entered
entering
enterobius
enters
entirely
entitled
entrance
entrances
entwining
envelope
environment
enzyme
enzymes
epidermis
epiglottis
epilepsy
epimysium
epinephrin
epithelial
equal
equalized
equalizing
equally
equinovarum
equipped
era
errand
error
erythema
escape
escapes
esophagus
esophogeal
essence
essential
essentials
estimates
etc.
ethical
ethmoid
Eustachian
evacuate
evaluate
evaluated
evaluation
evasive
event
events
everybody
everyone
evil
exact
exactly
examination
examined
examples
exceeds
excess
excessive
exchange
excreta

excretory	extra	fearful	finish	focus
excuse	extreme	fed	finished	fold
exercise	extremely	feeding	finite	folded
exerted	extremities	feelings	firmly	folds
exhibits	faces	feels	firmness	folks
exist	facial	female*	firstaid	follicles
existing	facilitate	femoral	fishworm	follow
exit	facility	fetal	fist	follows
exiting	factor	fetus	fit	foods
exits	factory	fever	fits	foot
exocrine	failure	fibers	fix	footboard
expiration	failures	fibrotic	fixed	forced
explain	fairly	fibrous	flakes	forcing
explanation	falls	fifth	flash	forearm
expose	false	fifty	flat	forgot
exposed	familial	fill	flattens	formal
exposes	familiar	filled	flatus	formation
exposing	families	filler	flexed	formulas
expressed	fast	filling	flexible	forth
extend	fasten	filter	floors	fortunately
extended	fastened	filtering	flow	forty
extending	fastens	financial	fluid*	fosters
extends	fat	finding	fluids	foundation
extension	fatal	finds	flush	fracture
extensions	fatigue	finger	flushed	fractures
extensive	fats	fingernail	fly	frame
external*	fatty	fingers	focal	framework

frank	genetically	gram	harmony	hips
freely	genital	grandparent	hasten	holder
freeze	genitals	grapefruit	hazardous	holding
freezing	gentle	graphs	hazards	holes
frequency	gently		headache	holidays
frequent	germicidal	gravity	heal	homemakers
frequently	gets	greatest	healing	honey
Friday	getter	greatly	hearing	hoop
frustration	girth	greenish	heat	hopper
fulcrum	giving	grounds	heated	horizontal
functional	gland	groupings	heavily	hormone
functioning	glands*	grow	heel	hormones
functions	glass	grown	hello	hose
fundamental	glove	guard	helped	hospitable
fungi	glucose	guess	helpful	hospitalize
furnishing	gluteal	guide	helping	hospitals
fusses	glycerol	guideline	helps	host
gain	goals	guidelines	hemolytic	housekeeping
gaining	goes	gurgling	hemorrhage	humidity
gallbladder	gonococcus	habits	hemothorax	hundreds
gas	gonorrhea	halter	hence	hungry
gases	goodness	hammer	hereditary	hurried
gauze	gotten	hamper	hidden	hurry
generalize	gown	handle	highest	hurt
generated	grab	hang	highly	hurting
generation	gradual	hangs	hinder	hurts
genetic	graduate	happens	hip	hygiene

hyper	improving	infections	injuries	interior
hyperalime	impulses	infectious	injury	interlacing
hyperextend	incapable	infective	ink	internal
hypersensis	inch	infestation	inner	interpersonal
hyphen	inches	inflammation	inns	interpret
hypothalam	incident	inflammator	insert	interrelation
hysterectomy	incise	inflammating	inserted	interruption
ice	incision	inflow	insertion	intervals
iced	included	influenced	inserts	interverted
identify	includes	inform	inspect	interview
ileac	incoming	informed	inspiration	intestinal
ilium	incompatible	infraction	inspired	intestine
ill	increases	infusion	instant	intestines
illegal	increasing	infusions	instituted	intolerance
illness	independent	ingested	institution	intrauterine
illnesses	index	inhabit	instruct	intravenous
illustrate	indicate	inhibit	instruction	introduce
imbalance	indicates	inhibits	instructor	introduced
immediately	indicating	initial	instrument	introduction
immobilize	indication	initially	insulin	introductor
immunization	induces	initiate	insure	invade
impaired	infant	initiated	intact	invades
impending	infants	initiative	intake	invasion
implies	infarction	inject	intent	invention
improper	infect	injected	interfere	inventory
improve	infected	injection	interference	involve
improves	infection*	injects	interferes	involvement

involves	keeping	largely	lets	liquids
involving	key	larynx	letting	listen
inward	keys	lately	levels	liver
iris	kidneys	latent	lever	lobe
irregular	kilo	lateral	levers	lobes
irreligious	kin	lateralis	levine	localized
irrigation	kinds	laterally	licensed	locate
irritable	kit	laundry	licensure	located
irritating	kitchen	laws	lie	location
irritation	knee	laxatives	lifesaving	lock
itching	knees	layer	lift	locked
item	knitting	layers	lifted	locking
IV	knob	leader	lifts	locks
ivac	knowledgeable	leading	ligaments	locomotion
jams	knows	leads	lightest	lodged
January	lab	learn	lightning	loneliness
jaw	label	leaves	lights	longterm
jawbone	labeled	leeches	limb	looks
jeopardize	laboratory	leg	limiting	loose
joins	laboring	legal	limits	loosely
joint	lace	legalized	lined	loosen
joints	lacrimation	legislature	linen	lose
judgment	lady	legs	linens	losing
juice*	lag	lengths	lining	loss
juices	laid	lengthwise	linked	lotion
jump	lanolin	lesions	linking	lots
jumping	lap	lesson	liquid	loud

LPN	malnutrition	meals	messages	modification
lubricant	malunion	meanings	metabolic	moist
lubricate	manage	meanwhile	metabolism	moistening
lubrication	managed	measure	metal	moistens
lues	manifest	measured	meter	moisture
lumbar	manifestation	measurement	metrazol	molecules
lumbard	manifested	measures	micro	monitoring
lumbosacral	mankind	measuring	microorganism	mopping
lumen	manual	meatus	microphone	motion
lump	mark	mechanical	microscope	motor
lung	marked	mechanics	microscopic	mouth*
lungs	marriage	mechanism	mild	movements
lymph	masceration	media	milk	moves
lysis	massage	medically	mineral	mucosa
machine	masses	medicated	minerals	mucous
mad	mastectomy	medication*	minimal	mucus
maintain	master	medicine	minimum	multiply
maintained	mastoikities	medium	minister	muscle*
maintaining	match	medulla	ministers	muscles*
maintains	matches	membrane	minor	muscular
maintenance	mate	membranes	minute	muslin
maker	materials	meningeal	misc.	myasthenia
male	matted	meningitis	mitochondria	myocardial
maleus	mattress	menstrual	mix	myocardium
malignancy	mature	menstruation	mixed	mysteries
malignant	maxilla	mental	mobility	nails
malnourish	maximum	mentioned	moderate	names

narcosis
narcotic
narcotics
narrow
nasal*
nationally
nausea
neat
neatness
neck
needing
needle*
neglect
neglected
neonatal
neurotic
nights
nine
ninety
ninetynine
nobody
nodes
noise
non
nonenergy
nonofficial
nonprofessional
nonprofit
nonstimulating
normally
nose
nostril
nostrils
notch
notebook
noted
notice
noticed
notify
nourishment
nowadays
nucleus
nurse*
nurses
nursing
nutrients
nutrition
oatmeal
object
objective
objects
obliged
observant
observation
observe
observed
observes
observing
obstetrical
obstruct
obstructed
obstruction
obtain
obtaining
obvious
occipital
occupies
occur
occurs
ocular
offer
offered
official
officials
offspring
oil
oils
ointment
older
olfactory
onto
opening
openings
operated
operating
operations
operative
opposite
optic
optimal
optional
oral
orally
orange
ordered*
orders*
ordinarily
ordinary
organ
organism
organisms
organized
organs
orientation
oriented
ortho
orthopedic
otherwise
otitis
outer
outflow
outlet
output
outward
oval
ovaries
ovary
overhead
oxidize
oxygen
oxygenation
o'clock
pace
packet
pad
pads
pain*
painful
palate
palpate
palpation
pan
pancreas
pancreatic
panel

pans	pause	persist	pin	pons
pap	pea	persistent	pinworm	poorly
paralysis	pear	personality	pitcher	popular
paralyzed	pectral	personnel	pituitary	port
parasitic	pediatric	perspiration	placement	portal
pardon	pelvic	persuasion	places	portion
parent	pelvis	pertaining	placing	positioned
park	penicillin	phagocytos	plain	positive
parked	percent	pharmacology	plasma	possibility
Parkinson's	perential	pharmacy	plastic	post
partial	perfect	pharynx	plate	postals
participate	perforation	phase	please	posted
particles	perform	philosophy	plenty	posterior
partition	performed	phonation	pleural	posteriorly
partitions	performs	phone	plug	posture
pass	perineal	physically	plunged	pot
passage	periodical	physician*	plus	potions
passages	periods	physicians	PM	pots
passageway	peripheral	physiological	pneumonia	pounded
passes	persistalis	physiology	pneumothorax	pour
passing	peritoneal	pick	pocket	poured
patch	perium	picked	pointed	pouring
pathological	permanent	picks	policies	poverty
patience	permanently	pictures	polio	powerhouse
patient*	permit	pieces	polluted	practical
patients*	permitted	pillow	pollution	practice
patterns	perpendicular	pills	polydactyl	practiced

practices
practition
prayers
praying
precaution
preceded
precedes
precipitation
precision
predispose
prefer
preferable
preferably
prefers
prefix
pregnancy
pregnant
prenighting
preoperation
preparation
prepare
prepared
prepares
prepping
prescribed
presence
presently
preserve
preset
pressed
pressures
prevent
prevented
preventing
prevention
preventive
prevents
previous
previously
priest
primary
printed
prior
privacy
probe
procedure*
procedures
proceed
processed
processes
produce
produced
produces
producing
profuse
project
prolonged
promptly
prone
pronunciate
prop
proper*
properly
proportion
protect
protected
protective
protects
protein
proteins
proven
provides
psyche
psychiatric
psychological
psychosis
psychosocial
psychosurgical
pubic
publicized
puffed
pull
pulley
pulleys
pulling
pulls
pulmonary
pulsation
pulse
pump
pumped
pumps
punch
punched
puncture
pupil
pupils
purge
purulent
push
pushbutton
pushed
pushing
pus
qualification
qualities
quantities
quantity
quick
quickly
quiet
quietly
rack
radial
radiation
radical
radiopaque
raise
ranks
rapid
rapidly
rash
rattle
ray
rays
reaching
reactions
reacts
readily
readings
readjustment
realize
rear
reasonable
reasons

reassemble
recall
receive
receives
receiving
receptacle
receptors
recognition
recommendation
recommended
recorded
recorder
recording
recordings
records
recovering
recovery
rectal
rectum
recumbent
recurrence
reduce
reduced
reestablish
refer
reference
referred
referring
refill
reflect
reflex
refrigerate
refusal
refuse
regarded
regarding
regardless
regimen
region
registered
registration
regular
regularly
regulate
regulated
regulates
regulating
regulation
rehabilitate
rejected
related
relation
relationship
relative
relatively
relax
relaxation
release
released
releasing
reliable
relieve
relieved
religions
remain
remains
remedies
remembered
remind
reminded
remote
removable
removal
remove
removed
removing
render
renewing
rented
repaired
repeat
replace
replaced
replacing
replenish
reports
represent
reprocessed
reproduction
request
requested
requesting
requests
require
requirement
requires
requiring
requisition
resembles
resembling
reserve
reservoir
resident
residual
resist
resistant
resisting
resources
respects
respiration
respirator
response
responses
responsible
resting
restless
restlessness
restore
restored
restoring
restrain
restraints
restrict
restricted
rests
resulted
resulting
retained
retardation
retention
reticulum
retina
retroperitoneal
reveal
reversed

review	rotate	samples	secondary	septisol
rheumatic	roughage	sampling	seconds	septum
rhintis	round	sanguineous	secretin	sequelae
rhythmical	route	satisfactory	secretions	sequential
rib	routes	satisfied	sections	seriously
ribbon	routine	Saturday	seldom	serous
robosomes	rubber	scab	select	serum
rice	rubella	scale	selected	serves
richest	rudimentary	scales	selection	servicemen
rid	ruled	scar	self	sets
rights	rules	scares	semi	setting
ring	ruling	scarred	semiliquid	seventy
ringers	rupture	schedule	send	severe
rinse	rural	schooling	sending	severed
rinsed	sac	sciatic	sends	shades
rinsing	sacrament	scientists	sensation	shake
risk	sacraments	scoop	sensations	shakes
robe	sacroiliac	scoot	sensing	shaking
rod	sacrum	scopes	sensitive	shancre
rods	sacs	score	sensitivity	shancres
role	safe	scrambled	sensor	shape
roof	safely	screen	sensorium	shaped
rooms	safety	screw	sensory	shaved
root	saline	sealed	separate	sheath
roots	salivary	search	separated	sheds
rope	salts	seat	separately	sheet
roped	sample	sebaceous	separates	shelf

shelves	signed	sling	soma	spirits
shields	significant	slip	somatic	spiritual
shift	signing	sloughs	somebody	spirochete
shifts	signs	slow	someone	spite
shirt	simpler	smaller	sophisticate	splints
shirts	sink	smear	sore	spoke
shock	sinuses	smell	sores	sponge
shocked	sit	smelling	sorry	spontaneous
shortened	site*	smoke	sounds	spot
shorter	sites	smoking	source	spray
shoulder	sitting	smooth	spare	sprayed
shoulders	situations	smoothly	spasm	spread
shove	sixty	snapped	spasms	spreader
showing	skeletal	sneezing	speaking	stable
shreaded	skill	sniffed	specialize	staffed
shrouded	skilled	soap	specialty	staffs
shut	skillful	soaps	specifically	stamp
shutting	skills	sock	specified	stamped
sick	skin*	socks	specimen	standards
sickness	skull	soda	specimens	standing
siderails	slack	soft	spectacular	stands
sides	sleep	softeners	spectrum	stapes
sight	sleeping	soil	speech	staphyloccal
sigmoid	sleeps	solid	speed	starts
sign	slept	solution	sphincter	stated
signal	slight	solutions	spilled	statistics
signature	slightly	solvent	spinal	status

stays	storeroom	style	supplied	switch
steady	stove	subclavian	supplies	sympathy
steel	straighten	subjective	supply	symptomatic
stem	strain	subsequent	supported	symptoms
stenosis	straining	subside	supporting	synchronize
stenotic	strains	substance	supports	syndrome
sterile	strands	substances	supposed	syntex
sterility	strangers	suck	suprarenal	synthesize
sterilize	strata	sucked	supreme	syphilis*
sterilized	stream	sudden	surfaces	syringe
stethoscope	streptocus	suffer	surgeon	systemic
stick	stretch	sufficient	surgeries	systole
stickiness	stretched	suffix	surgery*	tablets
stiff	stretcher	sugar	surgical	tact
stimulate	stretchers	suggestion	surmise	takes
stimulated	stretches	suitable	surround	talipes
stimulating	strikes	suited	surrounding	talked
stimulation	strings	suites	susceptible	talking
stoma	strip	sum	suspected	tangled
stomach*	strives	summary	swab	tape
stool	stroke	super	swallow	taped
stools	structors	superior	swallowing	taragon
stooping	structure*	superstition	swallows	target
stopper	structures	supervision	sweat	targets
stoppers	studies	supervisor	sweats	task
storage	stunted	supine	swelling	taut
stored	stupor	supper	swipes	teaching

teachings
team
technician
technique
techniques
techs
teeth
telephone
television
telling
tells
temp.
temporal
tempting
tends
tension
tent
term
terminal
terminated
termination
terribly
tertiary
testing
tests
thalamus
thank*
thanks
theories
therapies
therapy
thermometer
thermostat
thickened
thicker
thigh
thin
thirty
thoroughly
thousand
thousands
threading
threadlike
threat
thrive
throat
throw
thumb
Thursday
thyroid
tidy
tied
tight
tighter
till
tilt
tiny
tip
tips
tired
tires
tissue*
tissues
title
toaster
toddlers
toe
toenails
toes
tomato
tomorrow
tongs
tongue
tonight
tools
tooth
tops
touch
tough
towards
towel
towels
toxic
toxins
trachea
tract
traction*
trait
transfer
transferred
transfusion
transient
transmission
transmitted
transport
transportation
transverse
trapeze
trapped
trash
trauma
travel
traveled
travels
tray
treating
treatments
treelike
triglycerin
trillionth
trim
trimester
trip
trochanter
troughlike
trunk
trunks
tube*
tubelike
tubes
tubing
tucking
Tuesday
tumor
tumors
turning
twenty
twice
tympanic
typical
ulcer
ulnar
unable
unauthorize
unbroken

unbuttons	unprotected	valuable	views	wards
uncomfortable	unreasonable	valuables	vigorously	warm
uncommunicable	unresponsible	valve	violating	warmer
unconstitute	unscrew	variations	visible	warming
uncover	untold	variety	vision	warms
underlies	untreated	vary	visitation	warning
undernourish	unusual	vein	visiting	wash*
understood	upper	venereal	visitors	washcloth
undertaken	upright	ventricle	vital	washed
undressing	upset	ventricles	vitamin	washer
undue	upsetting	ventricular	vitamins	washes
unemployment	urge	verify	vocal	washing
unequivocal	urinal	vermicular	voltage	waste
unethical	urinary	versus	voluntary	watch
unfastened	urine	vertebrae	volunteers	watched
unfastens	usable	vertically	vomit	watery
unique	uses	vessel	vomiting	wax
unit*	usual	vessels	vowel	waxing
units	uterine	via	voxiodem	weakening
unknown	uterus	viability	waist	weakness
unless*	utility	vial	wait	wear
unlock	vaccine	vibrates	waking	weather
unlocked	vacoliter	vibrating	walk	weaving
unnecessary	vacutainer	vibrations	walking	wedgeshape
unnoticed	vagina	vice	walks	weekends
unpleasant	vaginal	vicinity	walls	weekly
unplugged	valid	victim	wants	weight

weights
welcome
wet
wheat
wheelchair
wheels
whenever
whereas
wherever
whitish
widely
widespread
willing
sipe
wiped
withdraw
wither
witnessed
witnessing
wondering
worker
workers
worm
worms
worn
worried
worry
worth
wound
wrap
writes
yarn
yellow
yesterday
youngsters
yours
yourself

APPENDIX B

HIGHEST FREQUENCY WORD LIST

The 100 words on the following page represented 45% of all the language sampled. This list is based on the combined oral and written language samples from all occupations studied. It shows the words used most frequently by adults in the ten jobs studied and in the vocational training programs corresponding to those jobs.

Total Words	=	180,000
Total Different Words	=	9,000

the	will	your	see
of	one	was	more
to	not	get	these
and	an	has	into
a	there	must	just
is	can	any	them
in	when	he	down
it	out	got	time
for	we	know	about
that	which	then	been
you	what	don't	some
be	do	each	business
or	up	air	how
on	pressure	check	its
are	two	that's	back
I	so	but	over
this	they	system	work
with	here	through	would
as	other	valve	temperature
by	ok	going	same
if	right	well	also
have	no	use	where
all	used	than	now
at	may	it's	only
from	should	go	like

APPENDIX C

SUMMARY OF OCCUPATIONAL LITERACY REQUIREMENTS

This appendix presents a brief summary of the literacy requirements for all ten occupations studied.

SUMMARY OF OCCUPATIONAL LITERACY REQUIREMENTS

	On The Job		Training Program	
	Reading	Mathematics	Reading	Mathematics
Account Clerk	College to college graduate level	addition, subtraction, multiplication, division, decimals, fractions, business machines	11th grade to college graduate	addition, subtraction, multiplication, division, fractions, decimals. algebra
Automotive Mechanic	9th to college graduate level	basic processes, decimals, fractions, measurement	9th to college graduate level	basic processes, decimals, fractions, measurement
Draftsman	10th grade to college graduate	basic processes, through geometry, algebra, trigonometry	9th grade to college level	basic processes, through geometry, algebra, trigonometry
Electrician	college to college graduate level	basic processes, throguh geometry, algebra, trigonometry	10th grade to college graduate level	basic processes, through geometry, algebra, trigonometry
Heating and Air conditioning Mechanic	10th grade to college graduate level	basic processes, decimals, fractions, measurement, algebra	11th grade to college graduate level	basic processes, fractions, decimals, measurement
Industrial Maintenance Mechanic	10th grade to college graduate level	basic processes through trigonometry	10th grade to college graduate level	basic processes, decimals, fractions, measurement
Licensed Practical Nurse	10th grade to college level	addition, and subtraction--more necessary to dispense medication	12th grade to college graduate level	addition and subtraction
Machine Tool Operator	9th to college graduate	basic processes, decimals, measurement	9th grade to college level	basic processes, decimals, measurement
Secretary	College to college graduate level	basic processes, decimals, fractions, business machines	10th grade to college level	basic processes, decimals, business machines
Welder	few materials--reading of single word information required	basic processes, fractions, decimals, measurement	8th grade to college graduate level	basic processes, fractions, decimals, measurement, algebra